TRANSPORT PROPERTIES OF POLYMER ELECTROYTES BASED ON POLY(ETHYLENE OXIDE) COMPLEXED WITH COPPER SALTS

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ABSTRACT

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Polymer electrolyte membranes have receiving a considerable attention in the recent past due to the possibility of using them as electrolytes in rechargeable batteries and other electrochemical devices. Among these electrolytes copper salt based electrolytes have several advantages over Lithium salt based electrolytes. Low cost, environmental and chemical stability, possibility of using Copper metal as an anode are some of these advantages. In this work we have synthesized $PEO_nCu(ClO_4)_2$ and PEO_nCuCl_2 electrolytes with n=3 to n=15 and PEO_6CuCl_2+10wt%Al_2O_3 and characterized them using electrical and thermal measurements. Results show that, out of the eight compositions studied, the $PEO_6Cu(ClO_4)_2$ composition had the maximum conductivity from room temperature up to 80 ^{0}C.

PEO_6CuCl_2+10wt%Al_2O_3(acidic) polymer electrolyte shows that the conductivity is enhanced due to the presence of the 10wt% Al_2O_3 filler particles. DC polarization measurements reveal that the majority of current carries by a single ion type. The results suggests that Lewis acid-base type intractions by H/OH groups on the surface of Al_2O_3 cations and anions and creating additional sites and favourable conducting pathways in the vicinity of grains for the migration of ions are responsible for the observed conductivity enhancement. According to the DC polarization measurements, the majority of current carries appears to be anions.